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ABSTRACT:

PURPOSE: To provide an image displaying method by which an image can be always and excellently displayed by the linear gradation characteristic without being affected by environmental light by changing a gradation correction table according to the level of the environmental light of a light emission display means.

CONSTITUTION: According to the information on the environmental light level of a light emission display means 6 that an environmental light level detection means 10 outputs, the gradation correction table of a gradation correction means 4 is changed so that the gradation characteristic of the light emission display means 6 under the level of environmental light may be linear by a gradation correction table change means 8. Thus, when an image is displayed with the light emission display means 6 after the gradation correction is performed for an image signal 2 in accordance with the gradation correction table of the gradation correction means 4, the gradation characteristic can be maintained linear even if environmental light exists or the level of environmental light is different. The gradation correction table is composed of a basic table component and an environmental light table component and the table is desirable to be the one changing the environmental light table component according to the level of environmental light level.

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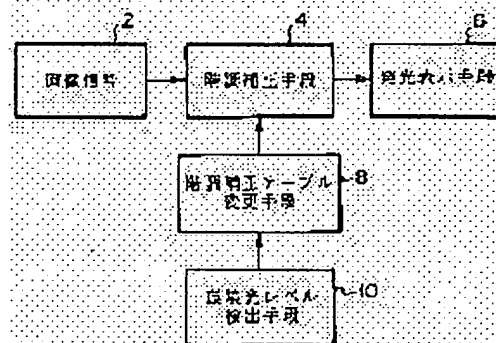
(54) METHOD FOR DISPLAYING IMAGE AND ITS DEVICE

(57)Abstract:

PURPOSE: To provide an image displaying method by which an image can be always and excellently displayed by the linear gradation characteristic without being affected by environmental light by changing a gradation correction table according to the level of the environmental light of a light emission display means.

CONSTITUTION: According to the information on the environmental light level of a light emission display means 6 that an environmental light level detection means 10 outputs, the gradation correction table of a gradation correction means 4 is changed so that the gradation characteristic of the light emission display means 6 under the level of environmental light may be linear by a gradation correction table change means 8.

Thus, when an image is displayed with the light emission display means 6 after the gradation correction is performed for an image signal 2 in accordance with the gradation correction table of the gradation correction means 4, the gradation characteristic can be maintained linear even if environmental light exists or the level of environmental light is different. The gradation correction table is composed of a basic table component and an environmental light table component and the table is desirable to be the one changing the environmental light table component according to the level of environmental light level.



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CLAIMS

[Claim(s)]

[Claim 1] The image-display approach of being the image-display approach which displays an image on the above-mentioned luminescence display means after performing gradation amendment to a picture signal according to the gradation amendment table which amends the gradation property of luminescence display means, such as CRT, to linearity, and carrying out changing the above-mentioned gradation amendment table according to the level of the ambient light of the above-mentioned luminescence display means so that the gradation property of the above-mentioned luminescence display means under the level of this ambient light may become linearity as the description.

[Claim 2] The image-display approach according to claim 1 characterized by to carry out by the above-mentioned gradation amendment table's consisting of a basic table component corresponding to the basic gradation property of the above-mentioned luminescence display means proper, and an ambient light table component corresponding to the level of the ambient light of the above-mentioned luminescence display means, and changing the above-mentioned ambient light table component for modification of the above-mentioned gradation amendment table according to the level of ambient light.

[Claim 3] According to the gradation amendment table which amends to linearity the gradation property of luminescence display means, such as CRT which displays an image, and this luminescence display means, gradation amendment is performed to a picture signal. An ambient light level output means to be the image display device which is equipped with a gradation amendment means to output the picture signal which performed this gradation amendment to the above-mentioned luminescence display means, and changes, and to output the information about the level of the ambient light of the above-mentioned luminescence display means, The image display device characterized by having a gradation amendment table modification means to change the above-mentioned gradation amendment table according to the level of the ambient light outputted from the above-mentioned ambient light level output means so that the gradation property of the above-mentioned luminescence display means under the level of this ambient light may become linearity, and changing.

[Claim 4] The image display device according to claim 3 which the above-mentioned gradation amendment table consists of a basic table component corresponding to the basic gradation property of the above-mentioned luminescence display means proper, and an ambient-light table component corresponding to the level of the ambient light of the above-mentioned luminescence display means, and carries out [that the above-mentioned gradation amendment table modification means is what performs by changing the above-mentioned ambient-light table component for modification of the above-mentioned gradation amendment table according to the level of ambient light, and] as the description.

[Claim 5] Claim 3 characterized by consisting of an ambient light level detection means by which the above-mentioned ambient light level output means detects and outputs the level of the above-mentioned ambient light, or an image display device given in four.

[Claim 6] Claim 3 characterized by consisting of an ambient light level-setting means by which the above-mentioned ambient light level output means outputs the level of the ambient light which has with a manual the ambient light level-setting section which can set up the level of the above-mentioned

ambient light, and was set up by this manual, or an image display device given in four.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is the image-display approach and the equipment which display an image on luminescence display means, such as CRT, is equipped with the gradation amendment table which amends the gradation property of the above-mentioned luminescence display means to linearity especially, and relates to the image-display approach and the equipment which display an image on the above-mentioned luminescence display means after performing gradation amendment to a picture signal according to this gradation amendment table.

[0002]

[Description of the Prior Art] When displaying an image on luminescence display means, such as CRT, it has the gradation amendment table which makes linearity the gradation property (the logarithm of a picture signal value and the brightness on a luminescence display means relation with a value) of a luminescence display means, and he is trying to display an image conventionally, after performing gradation amendment to a picture signal image according to this gradation amendment table.

[0003] And the luminescence display means was the gradation property (this is hereafter called gradation property of a luminescence display means proper) of not amending [which it originally has], the conventional above-mentioned gradation amendment table was usually created so that the gradation property (this is hereafter called basic gradation property) of the proper in a dark-room condition might be amended to linearity, it was a fixed value and this table was what cannot be changed easily.

[0004]

[Problem(s) to be Solved by the Invention] However, even if it is influenced by ambient light, changes and performs gradation amendment using the conventional gradation amendment table like the above, the gradation property in the screen of a luminescence display means, for example, the tubular surface of CRT, separates greatly from a linearity property under bright ambient light from the gradation property after amendment, the black part of an image is crushed, i.e., the contrast of a black part falls and it will have the problem that where of a signal cannot distinguish.

[0005] That is, generally, CRT has the gradation property of each CRT proper, and since the brightness of CRT of this gradation property itself is low when it exists, the light, i.e., the ambient light, around a CRT tubular surface, although it is a curve (basic gradation property) as shown as the continuous line A for example, in drawing 5 in the state of a dark room, a dynamic range is compressed by reflection of ambient light, and as the gradation property of a proper shows as continuous lines B and C, it changes. And when gradation amendment is performed to the gradation property of such a proper using the conventional gradation amendment table as shown with the broken line A1 in this drawing created so that the basic gradation property A might be amended to linearity, As the gradation property after the amendment is shown in drawing 6, as a continuous line A shows, in the case of a dark-room condition, become linearity, but When ambient light exists, as continuous lines B and C show, it becomes a flat, the low part, i.e., the black part, of brightness, and the phenomenon in which the contrast of this part will be fallen and crushed arises.

[0014]

[Function and Effect(s) of the Invention] Since the image display approach and equipment concerning this invention are constituted so that a gradation amendment table may be changed like the above according to the level of the ambient light of a luminescence display means Whether ambient light exists or the level of this ambient light differs, a gradation property can be maintained to linearity, therefore an image can always be displayed good over all density ranges, and the problem that the black part of an image will be crushed can be solved.

[0015] Moreover, a gradation amendment table constitutes from a basic table component corresponding to the basic gradation property of a luminescence display means proper, and an ambient-light table component corresponding to the level of the ambient light of the above-mentioned luminescence display means, and when change the above-mentioned gradation amendment table and it constitutes so that only the above-mentioned ambient-light table component may change according to the level of ambient light, the gradation amendment table according to the level of the above-mentioned ambient light can change very easily as mentioned above. That is, although the above-mentioned gradation amendment table is a nonlinear table, and it is very troublesome to change all the data of this nonlinear table and it is difficult, it can change easily only by changing this ambient light table component by constituting a gradation amendment table from a basic table component and an ambient light table component as mentioned above.

[0016]

[Example] Hereafter, the example of this invention is explained to a detail, referring to a drawing.

[0017] Drawing 1 is the block diagram showing one example of the image display device concerning this invention. The gradation amendment means 4 which the display of illustration is a display which displays a medical image, and carries out gradation amendment of the picture signal 2, CRT6 as an example of a luminescence display means to display the image which this picture signal bears based on the picture signal by which gradation amendment was carried out with this gradation amendment means 4, A gradation amendment table modification means 8 to change the gradation amendment table used in case gradation amendment is carried out with the above-mentioned gradation amendment means 4, It has an ambient light level detection means 10 to detect the level (brightness) of the ambient light which is the light which carries out incidence, the screen, i.e., the CRT tubular surface, of the above CRT 6, and to input the detected ambient light level into the above-mentioned gradation amendment table modification means 8, and changes. The above-mentioned ambient light level detection means 10 is an example of an ambient light level output means to output the information about the ambient light level of CRT.

[0018] The above-mentioned gradation amendment means 4 has the gradation amendment table for carrying out gradation amendment, that is, carrying out signal transformation of the inputted picture signal 2. This gradation amendment table is created as follows.

[0019] Namely, gradation property [of CRT under a certain ambient light level first] $F(s)$ (this $F(s)$ is the relational expression of a picture signal value and the opposite numeric value of the brightness on CRT) It asks according to a degree type.

[0020] $F(s) = \log(f(s) + \text{offset})$

However, $f(s)$: The basic gradation property offset of a CRT proper: Gradation property [of CRT under ambient light level, i.e., a certain ambient light level,] $F(s)$ Basic gradation property f which is known (s) The predetermined ambient light level offset is applied and it asks for it by carrying out log conversion further.

[0021] Next, gradation property F for which carried out in this way and it asked (s) It is based and is this gradation property $F(s)$. An inverse function table (table on which a linearity property is acquired by multiplying by $F(s)$) is computed, and let this be the above-mentioned gradation amendment table.

[0022] the gradation property (the basic gradation property above-mentioned when A is the dark room whose ambient light level is zero that is, --) of the CRT [drawing 3] proper under each ambient light level in a continuous line As for B, ambient light level shows the gradation amendment table under each of that ambient light level with the case where ambient light level of C is smallness in an adult case, and

a broken line (when A1 is the dark room whose ambient light level is zero and ambient light level is [as for B1 / the ambient light level of C1] smallness in an adult case).

[0023] Moreover, the gradation property of CRT6 under each ambient light level at the time of carrying out gradation amendment according to the above-mentioned gradation amendment tables A1, B1, and C1 is shown in drawing 4. That is, by performing gradation amendment according to the above-mentioned gradation amendment tables A1, B1, and C1, linearization of the gradation property of CRT6 after amendment is carried out in a range [being compressed without opening a dynamic range under each ambient light level], and crushing of a black part is avoided by this linearization.

[0024] the above steps -- gradation property $F(s)$ asking -- this $F(s)$ from -- this -- $F(s)$ By creating a gradation amendment table at the step of asking for an inverse function table, a gradation amendment table can be easily changed according to ambient light level only by changing the above-mentioned ambient light level offset.

[0025] Next, other example equipments shown in drawing 2 are explained. Although the ambient light level detection means 10 was used for the example shown in above-mentioned drawing 1 as an ambient light level output means to output the information about the ambient light level of Above CRT, the ambient light level-setting means 12 is used for the example shown in this drawing 2 instead of the ambient light level detection means 10 as an ambient light level output means.

[0026] The above-mentioned ambient light level-setting means 12 has with a manual the ambient light level-setting section which can set up the level of ambient light and which is not illustrated, and inputs into the gradation amendment table modification means 8 the level of the ambient light set up by this manual. In addition, since the configuration of those other than ambient light level-setting means 12 is the same as that of the example shown in above-mentioned drawing 1, the same number is given to the same component and detailed explanation is omitted.

[0027] Although the example shown in above-mentioned drawing 1 changed the gradation amendment table automatically according to the level of ambient light by using the ambient light level detection means 10 A user judges the level of ambient light under a user's feeling, or the example shown in drawing 2 enables it to carry out a setting input by the other approaches at arbitration. In this case For example, it is also possible to make different image display by carrying out the setting input of two or more ambient light level perform, and to choose the optimal image display out of it.

[0028] Since according to the above-mentioned image display device it is constituted so that a gradation amendment table may be changed according to the level of the ambient light of CRT6, whether ambient light exists or the level of this ambient light differs, a gradation property can be maintained to linearity, therefore an image can always be displayed good over all density ranges, and the problem that the black part of an image will be crushed can be solved.

[0029] Moreover, for the above-mentioned image display device, a gradation amendment table is basic gradation property [of CRT6 proper] $f(s)$. It is based on the level offset of the ambient light of CRT6, and is gradation property [of CRT6] $F(s)$. It asks. This gradation property $F(s)$ It is based and is this gradation property $F(s)$. Although a gradation amendment table is changed according to each ambient light level by being computed as an inverse function and changing the value of the above-mentioned ambient light level offset Since this gradation amendment table is computed based on a basic gradation property and the level of ambient light as mentioned above It is what consists of a basic table component corresponding to a basic gradation property, and an ambient light table component corresponding to the level of ambient light after all. And changing a gradation amendment table means changing a gradation amendment table by changing an ambient light table component after all by changing the value of the ambient light level offset.

[0030] And although a gradation amendment table is a nonlinear table, and it is very troublesome to change all the data of this nonlinear table and it is difficult, since modification of the gradation amendment table according to the level of ambient light is possible only by changing this ambient light table component by constituting a gradation amendment table from a basic table component and an ambient light table component as mentioned above, this change can be made easily.

[0031] In addition, as this luminescence display means, although CRT was used for the above-

mentioned example as a luminescence display means, if an image is displayed by luminescence in short, anythings can be used for it, for example, a flat-panel display like a plasma display or a liquid crystal display can also be used for it. that to which such a luminescence display means cannot enlarge an intensity level so much fundamentally -- it is -- such a case -- the effect of ambient light -- the above -- it is because it is what the problem that a black part is crushed produces.

[0032] Moreover, although aimed at what displays a medical image by the above-mentioned example, it is because this has the remarkable problem by a black part being crushed especially by effect of the above-mentioned ambient light when displaying a medical image, and this invention can be suitably applied also in what displays other natural images.

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TECHNICAL FIELD

[Industrial Application] This invention is the image-display approach and the equipment which display an image on luminescence display means, such as CRT, is equipped with the gradation amendment table which amends the gradation property of the above-mentioned luminescence display means to linearity especially, and relates to the image-display approach and the equipment which display an image on the above-mentioned luminescence display means after performing gradation amendment to a picture signal according to this gradation amendment table.

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PRIOR ART

[Description of the Prior Art] When displaying an image on luminescence display means, such as CRT, it has the gradation amendment table which makes linearity the gradation property (the logarithm of a picture signal value and the brightness on a luminescence display means relation with a value) of a luminescence display means, and he is trying to display an image conventionally, after performing gradation amendment to a picture signal image according to this gradation amendment table.

[0003] And the luminescence display means was the gradation property (this is hereafter called gradation property of a luminescence display means proper) of not amending [which it originally has], the conventional above-mentioned gradation amendment table was usually created so that the gradation property (this is hereafter called basic gradation property) of the proper in a dark-room condition might be amended to linearity, it was a fixed value and this table was what cannot be changed easily.

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EFFECT OF THE INVENTION

[Function and Effect(s) of the Invention] Since the image display approach and equipment concerning this invention are constituted so that a gradation amendment table may be changed like the above according to the level of the ambient light of a luminescence display means, Whether ambient light exists or the level of this ambient light differs, a gradation property can be maintained to linearity, therefore an image can always be displayed good over all density ranges, and the problem that the black part of an image will be crushed can be solved.

[0015] Moreover, a gradation amendment table constitutes from a basic table component corresponding to the basic gradation property of a luminescence display means proper, and an ambient-light table component corresponding to the level of the ambient light of the above-mentioned luminescence display means, and when change the above-mentioned gradation amendment table and it constitutes so that only the above-mentioned ambient-light table component may change according to the level of ambient light, the gradation amendment table according to the level of the above-mentioned ambient light can change very easily as mentioned above. That is, although the above-mentioned gradation amendment table is a nonlinear table, and it is very troublesome to change all the data of this nonlinear table and it is difficult, it can change easily only by changing this ambient light table component by constituting a gradation amendment table from a basic table component and an ambient light table component as mentioned above.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, even if it is influenced by ambient light, changes and performs gradation amendment using the conventional gradation amendment table like the above, the gradation property in the screen of a luminescence display means, for example, the tubular surface of CRT, separates greatly from a linearity property under bright ambient light from the gradation property after amendment, the black part of an image is crushed, i.e., the contrast of a black part falls and it will have the problem that where of a signal cannot distinguish.

[0005] That is, generally, CRT has the gradation property of each CRT proper, and since the brightness of CRT of this gradation property itself is low when it exists, the light, i.e., the ambient light, around a CRT tubular surface, although it is a curve (basic gradation property) as shown as the continuous line A for example, in drawing 5 in the state of a dark room, a dynamic range is compressed by reflection of ambient light, and as the gradation property of a proper shows as continuous lines B and C, it changes. And when gradation amendment is performed to the gradation property of such a proper using the conventional gradation amendment table as shown with the broken line A1 in this drawing created so that the basic gradation property A might be amended to linearity, As the gradation property after the amendment is shown in drawing 6, as a continuous line A shows, in the case of a dark-room condition, become linearity, but When ambient light exists, as continuous lines B and C show, it becomes a flat, the low part, i.e., the black part, of brightness, and the phenomenon in which the contrast of this part will be fallen and crushed arises.

[0006] In addition, change of the gradation property by the above-mentioned ambient light differs according to the level (brightness) of ambient light, a dynamic range becomes small, so that the level of ambient light is large, as shown in drawing 5 and 6, therefore the range which collapses the account of a top becomes large. Moreover, the gradation amendment table shown with the above-mentioned broken line A1 is a table on which the inverse function of the basic gradation property shown as the continuous line A in drawing 5, i.e., a linear gradation property as shown as the continuous line A in drawing 6 by multiplying by the basic gradation property shown as a continuous line A, is obtained.

[0007] The purpose of this invention is to offer the image display approach and equipment which can always display an image on fitness over all density ranges in a linear gradation property, without being influenced by ambient light in displaying an image on luminescence image display devices, such as CRT.

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MEANS

[Means for Solving the Problem] The image display approach concerning this invention is the image display approach which displays an image on the above-mentioned luminescence display means after performing gradation amendment to a picture signal according to the gradation amendment table which amends the gradation property of luminescence display means, such as CRT, to linearity, in order to attain the above-mentioned purpose. The above-mentioned gradation amendment table It is characterized by changing according to the level of the ambient light of the above-mentioned luminescence display means, so that the gradation property of the above-mentioned luminescence display means under the level of this ambient light may become linearity.

[0009] In the above-mentioned method of presentation, the above-mentioned gradation amendment table can be constituted from a basic table component corresponding to the basic gradation property of the above-mentioned luminescence display means proper, and an ambient light table component corresponding to the level of the ambient light of the above-mentioned luminescence display means, and a change of the above-mentioned gradation amendment table can be made by changing the above-mentioned ambient light table component according to the level of ambient light.

[0010] Luminescence display means, such as CRT which displays an image in order that the image display device concerning this invention may attain the above-mentioned purpose, According to the gradation amendment table which amends the gradation property of this luminescence display means to linearity, gradation amendment is performed to a picture signal. An ambient light level output means to be the image display device which is equipped with a gradation amendment means to output the image which performed this gradation amendment to the above-mentioned luminescence display means, and changes, and to output the information about the level of the ambient light of the above-mentioned luminescence display means, It is characterized by having a gradation amendment table modification means to change the above-mentioned gradation amendment table according to the level of the ambient light outputted from the above-mentioned ambient light level output means so that the gradation property of the above-mentioned luminescence display means under the level of this ambient light may become linearity, and changing.

[0011] The above-mentioned gradation amendment table can constitute from a basic table component corresponding to the basic gradation property of the above-mentioned luminescence display means proper, and an ambient-light table component corresponding to the level of the ambient light of the above-mentioned luminescence display means, and in the above-mentioned indicating equipment, it can constitute so that the above-mentioned gradation amendment table modification means may make a change of the above-mentioned gradation amendment table by changing the above-mentioned ambient-light table component according to the level of ambient light.

[0012] An ambient light level detection means to detect and output the level of the above-mentioned ambient light can constitute the above-mentioned ambient light level output means.

[0013] The above-mentioned ambient light level output means has with a manual the ambient light level-setting section which can set up the level of the above-mentioned ambient light, and can constitute it with an ambient light level-setting means to output the level of the ambient light set up by this manual.

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EXAMPLE

[Example] Hereafter, the example of this invention is explained to a detail, referring to a drawing. [0017] Drawing 1 is the block diagram showing one example of the image display device concerning this invention. The gradation amendment means 4 which the display of illustration is a display which displays a medical image, and carries out gradation amendment of the picture signal 2, CRT6 as an example of a luminescence display means to display the image which this picture signal bears based on the picture signal by which gradation amendment was carried out with this gradation amendment means 4, A gradation amendment table modification means 8 to change the gradation amendment table used in case gradation amendment is carried out with the above-mentioned gradation amendment means 4, It has an ambient light level detection means 10 to detect the level (brightness) of the ambient light which is the light which carries out incidence, the screen, i.e., the CRT tubular surface, of the above CRT 6, and to input the detected ambient light level into the above-mentioned gradation amendment table modification means 8, and changes. The above-mentioned ambient light level detection means 10 is an example of an ambient light level output means to output the information about the ambient light level of CRT.

[0018] The above-mentioned gradation amendment means 4 has the gradation amendment table for carrying out gradation amendment, that is, carrying out signal transformation of the inputted picture signal 2. This gradation amendment table is created as follows.

[0019] Namely, gradation property [of CRT under a certain ambient light level first] $F(s)$ (this $F(s)$ is the relational expression of a picture signal value and the opposite numeric value of the brightness on CRT) It asks according to a degree type.

[0020] $F(s) = \log(f(s) + \text{offset})$

However, $f(s)$: The basic gradation property offset of a CRT proper: Gradation property [of CRT under ambient light level, i.e., a certain ambient light level,] $F(s)$ Basic gradation property f which is known (s) The predetermined ambient light level offset is applied and it asks for it by carrying out log conversion further.

[0021] Next, gradation property F for which carried out in this way and it asked (s) It is based and is this gradation property $F(s)$. An inverse function table (table on which a linearity property is acquired by multiplying by $F(s)$) is computed, and let this be the above-mentioned gradation amendment table.

[0022] the gradation property (the basic gradation property above-mentioned when A is the dark room whose ambient light level is zero that is, --) of the CRT [drawing 3] proper under each ambient light level in a continuous line As for B, ambient light level shows the gradation amendment table under each of that ambient light level with the case where ambient light level of C is smallness in an adult case, and a broken line (when A1 is the dark room whose ambient light level is zero and ambient light level is [as for B1 / the ambient light level of C1] smallness in an adult case).

[0023] Moreover, the gradation property of CRT6 under each ambient light level at the time of carrying out gradation amendment according to the above-mentioned gradation amendment tables A1, B1, and C1 is shown in drawing 4. That is, by performing gradation amendment according to the above-mentioned gradation amendment tables A1, B1, and C1, linearization of the gradation property of CRT6

after amendment is carried out in a range [being compressed without opening a dynamic range under each ambient light level], and crushing of a black part is avoided by this linearization.

[0024] the above steps -- gradation property $F(s)$ asking -- this $F(s)$ from -- this -- $F(s)$ By creating a gradation amendment table at the step of asking for an inverse function table, a gradation amendment table can be easily changed according to ambient light level only by changing the above-mentioned ambient light level offset.

[0025] Next, other example equipments shown in drawing 2 are explained. Although the ambient light level detection means 10 was used for the example shown in above-mentioned drawing 1 as an ambient light level output means to output the information about the ambient light level of Above CRT, the ambient light level-setting means 12 is used for the example shown in this drawing 2 instead of the ambient light level detection means 10 as an ambient light level output means.

[0026] The above-mentioned ambient light level-setting means 12 has with a manual the ambient light level-setting section which can set up the level of ambient light and which is not illustrated, and inputs into the gradation amendment table modification means 8 the level of the ambient light set up by this manual. In addition, since the configuration of those other than ambient light level-setting means 12 is the same as that of the example shown in above-mentioned drawing 1, the same number is given to the same component and detailed explanation is omitted.

[0027] Although the example shown in above-mentioned drawing 1 changed the gradation amendment table automatically according to the level of ambient light by using the ambient light level detection means 10 A user judges the level of ambient light under a user's feeling, or the example shown in drawing 2 enables it to carry out a setting input by the other approaches at arbitration. In this case For example, it is also possible to make different image display by carrying out the setting input of two or more ambient light level perform, and to choose the optimal image display out of it.

[0028] Since according to the above-mentioned image display device it is constituted so that a gradation amendment table may be changed according to the level of the ambient light of CRT6, whether ambient light exists or the level of this ambient light differs, a gradation property can be maintained to linearity, therefore an image can always be displayed good over all density ranges, and the problem that the black part of an image will be crushed can be solved.

[0029] Moreover, for the above-mentioned image display device, a gradation amendment table is basic gradation property [of CRT6 proper] $f(s)$. It is based on the level offset of the ambient light of CRT6, and is gradation property [of CRT6] $F(s)$. It asks. This gradation property $F(s)$ It is based and is this gradation property $F(s)$. Although a gradation amendment table is changed according to each ambient light level by being computed as an inverse function and changing the value of the above-mentioned ambient light level offset Since this gradation amendment table is computed based on a basic gradation property and the level of ambient light as mentioned above It is what consists of a basic table component corresponding to a basic gradation property, and an ambient light table component corresponding to the level of ambient light after all. And changing a gradation amendment table means changing a gradation amendment table by changing an ambient light table component after all by changing the value of the ambient light level offset.

[0030] And although a gradation amendment table is a nonlinear table, and it is very troublesome to change all the data of this nonlinear table and it is difficult, since modification of the gradation amendment table according to the level of ambient light is possible only by changing this ambient light table component by constituting a gradation amendment table from a basic table component and an ambient light table component as mentioned above, this change can be made easily.

[0031] In addition, as this luminescence display means, although CRT was used for the above-mentioned example as a luminescence display means, if an image is displayed by luminescence in short, anythings can be used for it, for example, a flat-panel display like a plasma display or a liquid crystal display can also be used for it. that to which such a luminescence display means cannot enlarge an intensity level so much fundamentally -- it is -- such a case -- the effect of ambient light -- the above -- it is because it is what the problem that a black part is crushed produces.

[0032] Moreover, although aimed at what displays a medical image by the above-mentioned example, it

is because this has the remarkable problem by a black part being crushed especially by effect of the above-mentioned ambient light when displaying a medical image, and this invention can be suitably applied also in what displays other natural images.

.....
[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block diagram showing the example of the image display device concerning this invention

[Drawing 2] The block diagram showing other examples of the image display device concerning this invention

[Drawing 3] Drawing showing the gradation amendment table to the gradation property of a luminescence display means proper and the gradation property of each proper in different ambient light level

[Drawing 4] Drawing showing the gradation property of the luminescence display means at the time of carrying out gradation amendment using the gradation amendment table shown in drawing 3

[Drawing 5] Drawing showing the gradation property of the proper of the luminescence display means in different ambient light level, and the conventional gradation amendment table

[Drawing 6] Drawing showing the gradation property of the luminescence display means at the time of carrying out gradation amendment using the conventional gradation amendment table

[Description of Notations]

2 Picture Signal

4 Gradation Amendment Means

6 Luminescence Display Means

8 Gradation Amendment Table Modification Means

10 Ambient Light Level Detection Means

12 Ambient Light Level-Setting Means

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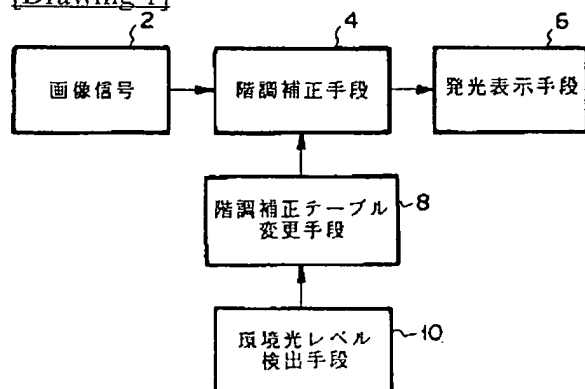
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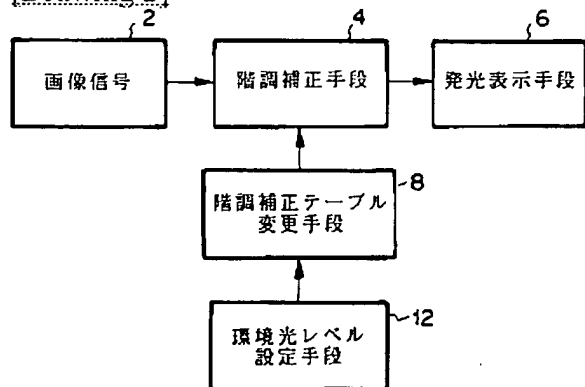
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DRAWINGS

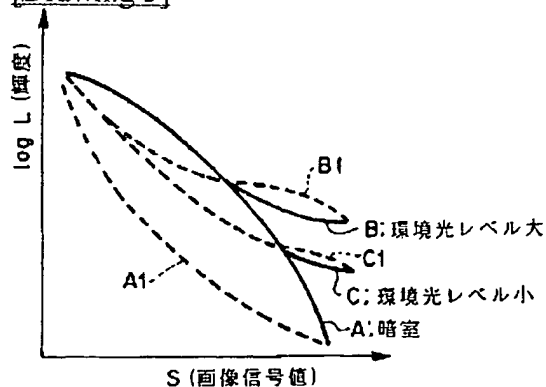
[Drawing 1]



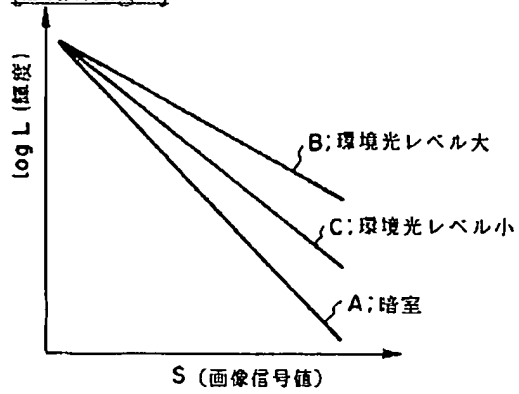
[Drawing 2]



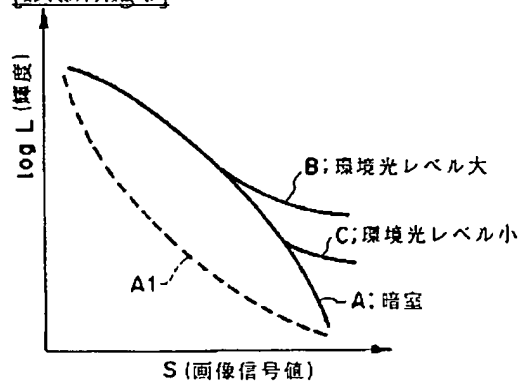
[Drawing 3]



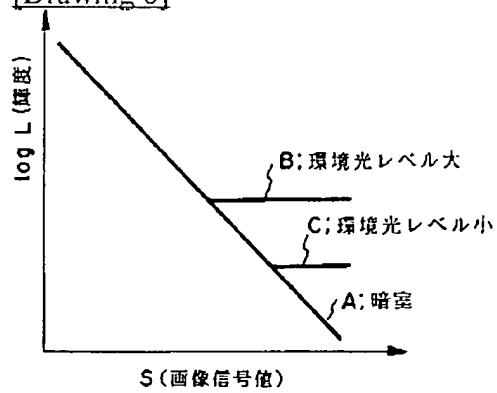
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Translation done.]

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